



H-1141

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

K. Serizawa et al.

Serial No. 10/825,158

Group Art Unit: 2188

Filed: April 16, 2004

Examiner: M. PADMANABHAN

For: METHOD FOR ALLOCATING STORAGE  
AREA TO VIRTUAL VOLUME

**PETITION TO MAKE SPECIAL**  
**UNDER 37 CFR §1.102(d) (MPEP §708.02(VIII))**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

February 17, 2005

Sir:

The Applicants petition the Commissioner to make the above-identified application special in accordance with 37 CFR §1.102(d).

In accordance with the requirements set forth in Manual of Patent Examining Procedure §708.02(VIII), the Applicants believe that all claims are directed to a single invention. If the Office determines that all claims are not directed to a single invention, Applicant will make an election without traverse as a prerequisite to the grant of special status.

Further, a pre-examination search has been conducted in the following areas: Class 711, subclasses 114, 148, 170, and 203. A key word search was also performed using the U.S.

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Patent and Trademark Office's Examiner Application Search Tool (EAST), and using the European Patent Office's ESPACENET database and Japanese patent database.

Of the documents reviewed during the search, those deemed to be most closely related to the subject matter encompassed by the claims are listed below. The claimed subject matter is believed to be patentable over the teachings of these documents for the reasons set forth. One copy of each of these documents accompanies this Petition.

Documents developed by the pre-examination search

U.S. Patents

6,032,224	Blumenau
6,799,245	Kochiya

U.S. Patent Application Publications

2002/0112113	Karpoff, et al.
2002/0120822	Li, et al.

Foreign Patent Documents

2000-298556	Japan
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**Blumenau, US 6,032,224** (Blumenau) discloses a hierarchical performance system for managing a plurality of storage units. In Blumenau, hierarchical performance driver 34 has an operating system device driver application

programming interface to remote storage access system 30 and a disk driver interface (DDI) to file system 32. Hierarchical performance driver 34 looks like a disk driver to file system 32, but its function is to transfer data to drivers 36-40 for local storage devices 22-26 and to transfer data to remote storage devices 16-20, and to monitor the rates of access of blocks of stored data by computer 12 in order to move blocks with faster access rates to faster storage devices and blocks with lower access rates to slower storage devices.

Blumenau, however, does not teach the claimed control unit that allocates a storage area of a plurality of storage systems to a virtual volume, and converts a write request from a computer to a write request to a storage system in accordance with the allocation, such that the storage system having the newly-allocated storage area transmits the updated write request. Further, Blumenau does not teach that a notice is issued to the effect that a predetermined size of the virtual volume has been allocated to the computer.

**Kochiya, US 6,799,245** (Kochiya) discloses a RAID apparatus that auto-adjusts loads between real volumes despite uneven loads between logical volumes. As shown in FIG. 7, queued accesses to individual logical volumes #0 to #3 are converted to accesses to magnetic disk units (real volumes)

11-1 to 11-4 by resource manager 21 and table storage 22, which includes conversion table 22-1 shown in FIG. 8A and use-state table 22-2 shown in FIG. 8B. The conversion table 22-1 stores, for each of the logical volumes #0-#3, the number of the real volume (magnetic disk unit) where the associated logical volume is allocated. For each logical volume, the conversion table 22-1 further stores a counter representing the multiplicity that indicates the quantity of that logical volume. The use-state table 22-2 indicates whether or not each real volume (magnetic disk unit) is in use, by means of a use flag as shown in FIG. 8B.

Kochiya, however, does not teach the claimed control unit that allocates a storage area of a plurality of storage systems to a virtual volume, and converts a write request from a computer to a write request to a storage system in accordance with the allocation, such that the storage system having the newly-allocated storage area transmits the updated write request. Further, Kochiya does not teach that a notice is issued to the effect that a predetermined size of the virtual volume has been allocated to the computer.

**Karpoff, et al., US 2002/0112113** (Karpoff) discloses a storage virtualization system that allocates physical storage from a storage pool dynamically in response to host I/O

requests, e.g., SCSI I/O requests, allowing for the amortization of storage resources through a disk subsystem while maintaining coherency amongst I/O RAID traffic. In one embodiment, the virtualization functionality is implemented in a controller device, such as a controller card residing in a switch device or other network device, coupled to a storage system on a storage area network (SAN). The resulting virtual disk image that is observed by the host computer is larger than the amount of physical storage actually consumed.

In response to a write request, Karpoff provides a method for dynamically mapping addresses between a virtual disk address and one or more physical block addresses for a storage system. The method typically includes receiving a write request from a host, the write request including a virtual memory address and one or more blocks of data, and determining whether memory space in the storage system has been allocated for the one or more blocks of data based on the virtual memory address. If it is determined that memory space has been allocated, the method typically includes completing the write operation to the allocated memory space. If it is determined that no memory space has been allocated, the method typically includes automatically allocating memory space in the storage

system for the one or more blocks of data, and completing the write operation to the allocated memory space.

Karpoff, however, does not teach the claimed control unit that allocates a storage area of a plurality of storage systems to a virtual volume, and converts a write request from a computer to a write request to a storage system in accordance with the allocation, such that the storage system having the newly-allocated storage area transmits the updated write request. Further, Kochiya does not teach that a notice is issued to the effect that a predetermined size of the virtual volume has been allocated to the computer.

**Li, et al., US 2002/0120822** (Li) discloses a method of memory space organization in which processor-based applications may be executed in independent devices 120-124 with respect to a central device 110. The central device 110 comprises a memory service component 115 that is capable of organizing and addressing memory portions from the first through nth devices 120-124. Applications being executed on the first through nth devices 120-124 and on the central device 110, may refer to memory spaces organized by the memory service component 115 in a symbolic addressing fashion.

The memory service component 115, which may be located in the central device 110, is capable of organizing memory

locations from each of the first through nth devices 120-124, such that a single device can access a portion of memory that is larger than the memory that is available on that particular device. Therefore, utilizing the memory service component 115, an application being executed on the first device 120 may direct a write sequence that will store the data file into the second, third, and the fourth devices 121-123. In other words, the application running in the first device 120, when executing a memory access, will "see" a 4-megabyte contiguous memory, even though that 4 megabyte memory is actually pooled from multiple locations in other devices 121-124.

By way of example, the second device 121 may initiate a write sequence which is intercepted by an address snooping agent 210 that redirects the write sequence onto the first device 120. The snooping agent 210 may be contained within the memory service component 115, and is capable of locating the address space provided by the memory service component 115, and redirecting a write sequence onto the proper target address. The address snooping agent 210 is capable of redirecting a write sequence that accesses an address space that is spread across several devices, under control of the memory service component 115, and therefore, has access to

addresses that point to memory space in the multiple devices 120-124.

Li, however, does not teach the claimed control unit that allocates a storage area of a plurality of storage systems to a virtual volume, and converts a write request from a computer to a write request to a storage system in accordance with the allocation, such that the storage system having the newly-allocated storage area transmits the updated write request. Further, Li does not teach that a notice is issued to the effect that a predetermined size of the virtual volume has been allocated to the computer.

**Japanese Patent Publication Laid-Open No. 2000-298556** (JP '556) discloses a disk array device having plural disk devices of respectively different capacity values. A control part 3 sets up individual divided areas obtained by dividing the disk areas of respective real disk devices by size as virtual disk devices, and establishing a disk array by using plural virtual disk devices including plural virtual devices generated on the same disk device. When read and write requests are outputted from a master device to the disk array, an address conversion part 4 refers to a disk constitution and converts the addresses of the virtual disk devices into the addresses of the real disk devices. However, JP '556 does not appear to



teach the claimed control unit that allocates a storage area of a plurality of storage systems to a virtual volume, and converts a write request from a computer to a write request to a storage system in accordance with the allocation, such that the storage system having the newly allocated storage area transmits the updated write request. Further, JP '556 does not appear to teach that a notice is issued to the effect that a predetermined size of the virtual volume has been allocated to the computer.

### **Conclusion**

The Applicants submit that the foregoing discussion demonstrates the patentability of the claimed invention over the closest known prior art. Accordingly, the requirements of 37 CFR §1.102(d) and MPEP §708.02 (VIII) having been satisfied, the Applicants request that this Petition be granted and that the application be examined according to prescribed procedures.

The Applicants prepared this Petition in order to satisfy the requirements of 37 C.F.R. §1.102(d) and MPEP §708.02 (VIII). The pre-examination search required by these sections "must be directed to the invention as claimed in the application for which special status is requested." MPEP

§708.02 (VIII). The search performed in support of this Petition is believed to be reasonable; however, the Applicants make no representation that the search covered every search area that may contain relevant prior art. Prior art of greater relevance to the claims may exist. The Applicants urge the Examiner to conduct his or her own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited above and any other prior art that may be located in the Examiner's independent search.

Further, while the Applicants have identified certain portions of each cited reference in order to satisfy the requirement for a "detailed discussion of the references, which discussion points out, with the particularly required by 37 C.F.R. §1.111(b) and (c), how the claimed subject matter is patentable over the references" (MPEP §708.02) (VIII), the Examiner should not limit review of these documents to the identified portions, but rather it is urged to review and consider the entirety of each reference.

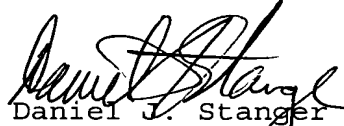
A Credit Card Payment Form in the amount of \$130.00 accompanies this Petition in satisfaction of the fee set forth

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in 37 CFR §1.17(h). The Commissioner is hereby authorized to charge any additional payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

Respectfully submitted,

  
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